Competing Populations in Flows with Chaotic Mixing

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Environmental flows lead to imperfect mixing, to a dynamically generated heterogeneity. This is the result of chaotic mixing, which is typical even for simple time-dependent flows. We show that one effect of chaotic advection on the passively advected species (such as phytoplankton [1, 2], or self-replicating macro-molecules [2]) is the possibility of coexistence of more species than that limited by the number of niches they occupy [1, 2]. We derive a novel set of dynamical equations for competing populations [3]. It turns out that important chaos parameters characterizing the advection modify the traditional population dynamics in a nontrivial way.

References

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